

Work Order ID 83696

April-23-12 4:00:11 PM

SCRAP

\*83696\*

~~U/R~~

Page 1

Item ID: D350-748-101

Accept

\*N9000040100\*

Setup Start \*NS1\*

Revision ID: U/R

Stop \*NS2\*

Item Name: Crosstube Installation, High Fwd



Start Date: 23/04/2012 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals: Process Plan: MLJ

Date: 12/04/24 Tooling:

Date:

Run Start \*NR1\*

QC:

Date:

SPC (Y/N):

Date:

Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D350-748-141	F U/R								

100

0.00

\*100\*

DOCUMENT CONTROL

DC

Memo

Document Control

Photocopy bluefile & type labels per PPD350-748-101 CHG002

SCRAP

110

0.00

\*110\*

BENDING MACHINE - CROSSTUBES

CNC Bend 1

Memo

CNC Delta 100 Bender

Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT

12-5-10

120

QC15- Crosstube Dimensional Check

0.00

\*120\*

QC

Memo

Quality Control

POSITIVE RECALL

EFFECTIVE AUTH

RELEASED DATE

Punch. issue P1040 meter  
P10: 16954 c/c 12/05/11  
word used inspect attached c/c to W10

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
12.05.15	100	Too narrow, one side > 0.5" narrow	W 12/5/15	SCRAP 12.05.15	12/05/15	S 12/05/15	W 12/05/15	S 12/05/15

NOTE: Date & initial all entries

**\*8.3696\***

Page 2

**\*N900040100\***

Setup Start \*NS1\*

Stop \*NS2\*

**\* 1 \***

**Cust Item ID:**

**\* 1 \***

**Customer:**

Run Start \*NR1\*

Stop \*NR2\*

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

**Insp.  
Stamp**

0.00

0.00

## Memo

\*\*\*Stress relief\*\*\*

Heat treat crosstube as per QSI010 4.3

Temp: \_\_\_\_\_

Start time:

Finish time: \_\_\_\_\_

QC6- Inspect dimensions to drawing

0.00

0.00

## Memo

## Quality Control

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**Work Order ID 83696****\*83696\***

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April-23-12 4:00:11 PM

Item ID: D350-748-101

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID: U/R

Stop **\*NS2\***

Item Name: Crosstube Installation, High Fwd

Start Date: 23/04/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan: \_\_\_\_\_

Date: \_\_\_\_\_

Tooling: \_\_\_\_\_

Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_

Date: \_\_\_\_\_

SPC (Y/N): \_\_\_\_\_

Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130	Crosstubes	0.00							
<b>*130*</b>									
Crosstubes	Memo	0.00							
Crosstubes	1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B &C Drill Jigs, Set-up drill table as per QSI 010								
	2-Deburr								
	3-Engrave Part # and Batch # as per Dwg D350-748-141								
	4-Remove all marks from tube within limits of D350-748-141								
	5- Apply a light coat of LPS3 on the interior of tube Batch: _____								
140	QC5- Inspect part completeness to step on W/O	0.00							
<b>*140*</b>									
QC	Memo	0.00							
Quality Control	CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)								

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Work Order ID 83696

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April-23-12 4:00:11 PM

Item ID: D350-748-101 Accept \*N900040100\* Setup Start \*NS1\*  
 Revision ID: U/R Stop \*NS2\*  
 Item Name: Crosstube Installation, High Fwd  
 Start Date: 23/04/2012 Start Qty: 1.00 \*1\* Cust Item ID:  
 Required Date: 07/05/2012 Req'd Qty: 1.00 \*1\* Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start \*NR1\*  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150	Outsource process-Cadplate per QSI017 4.1.9.1	0.00							
*150*									
Outsource3	Memo	0.00							
Outsource process - Cad plate	Issue P/O: _____ Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possible Supplier: Southwest United Industries Ensure Certificate of Conformity is attached								
160	Receive & Inspect for Damage & Mat'l Certs	0.00							
*160*									
Packaging	Memo	0.00							
Packaging	Ensure certificate of conformity is attached								
170	QC5- Inspect part completeness to step on W/O	0.00							
*170*									
QC	Memo	0.00							
Quality Control									

★ SEE LAD CHG ATTACHED

POSITIVE RECALL  
 EFFECTIVE 12-04-14 AUTH CP  
 RELEASED \_\_\_\_\_ DATE \_\_\_\_\_  
 LAD TEST

1X  
 12-5-15

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

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**\*N900040100\***

Setup Start **\*NS1\***

Stop **\*NS2\***

**Customer:**

Run Start \*NR1\*

Stop \*NR2\*

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

1-Prime inside crosstube as per QSI 005 4.2  
2-Prime Outside of Tube as per Dart QSI 005 4.2

Quality Control                      Then, Wrap in plastic bag to protect from scratches

**3-Install supports Using Dt8876 as per Dwg D350-748-141,Torque to 60-80 IN-LBS**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

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# Work Order ID 83696

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April-23-12 4:00:11 PM

Item ID: D350-748-101 Accept \*N900040100\* Setup Start \*NS1\*  
 Revision ID: U/R Stop \*NS2\*  
 Item Name: Crosstube Installation, High Fwd  
 Start Date: 23/04/2012 Start Qty: 1.00 \*1\* Cust Item ID:  
 Required Date: 07/05/2012 Req'd Qty: 1.00 \*1\* Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start \*NR1\*  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	QC5- Inspect part completeness to step on W/O	0.00							
*210*									
QC	Memo	0.00							
Quality Control									
220	Pick Kit	0.00							
*220*									
Packaging	Memo	0.00							
Packaging									
230	QC4- 100% Inspect kits for completeness	0.00							
*230*									
QC	Memo	0.00							
Quality Control									

7

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

**Work Order ID 83696****\*83696\***

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Item ID: D350-748-101

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID: U/R

Stop **\*NS2\***

Item Name: Crosstube Installation, High Fwd

Start Date: 23/04/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
<b>*240*</b>	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPP D350-748-101								
	Location: _____								
	PPP Rev: _____								
250		0.00							
<b>*250*</b>	QC21- Final Inspection - Work Order Release								
QC	Memo	0.00							
Quality Control									

ME  
12-05-23

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

April-23-12 4:00:14 PM

**\*83696\***

**Parent Item:** D350-748-101

**\*D350-748-101\***

**Parent Item Name:** Crosstube Installation, High Fwd

**Start Date:** 23/04/2012

**Required Date:** 07/05/2012

**Start Qty: 1.00**

**Required Qty: 1.00**

**Comments:**

IPP Rev:A New Issue 06-07-05 JLM

IPP Rev:B    Update qty of MS21042L5    06-09-12    KJ

IPP Rev:C    Rev B    07-11-15    DD

IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD

IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F

10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-141TRN		Manufactured	No			110	Each	1.0000	1	1			
*D350-748-141TRN*													
Crosstube Turning Detail													
				<u>Location</u>			<u>Loc Qty</u>	<u>Loc Code</u>					
				LG			1						
					83278		1						
ALS4-1032-225		Purchased	No			200	Each	1,850.000	1	1			
*ALS4-1032-225*													
Insert													
				<u>Location</u>			<u>Loc Qty</u>	<u>Loc Code</u>					
				ST281			1827						
					108696		146						
					110768		62						
					118386		55						
					118966		68						
					121269		1496						
				ST282			23						
					120410		10						
					120451		13						
AN960JD10	NAS1149D0363J	Purchased	No			200	Each	0.0000	1	1			
*AN960JD10*													
Washer													

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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# Picklist Print

April-23-12 4:00:15 PM

Page 2

Work Order ID: 83696

\*83696\*

Parent Item: D350-748-101

\*D350-748-101\*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 23/04/2012

Required Date: 07/05/2012

Start Qty: 1.00

Required Qty: 1.00

D2856-400

Manufactured No

200

f

353.5345

1.181

1.243158

\*D2856-400\*

Abrasion Strip

\*\*

Location

Loc Qty

Loc Code

ST403

216

81875

216

ST409

137.5345

63735

0.6696

68076

0.3149

71164

8.46

79551

128.09

D3502-1

Manufactured No

200

Each

39.0000

2

2

\*D3502-1\*

Support

\*\*

Location

Loc Qty

Loc Code

ST051

39

73419

19

74873

20

MS21920-20

Purchased No

200

Each

128.0000

2

2

\*MS21920-20\*

Clamp (per MIL-DTL-8783C)

\*\*

Location

Loc Qty

Loc Code

LG050

128

116799

8

120676

20

121067

50

121274

50

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Shop Packet Print

Page 2

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Page 3

Work Order ID: 83696

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

**\*83696\***

**\*D350-748-101\***

Start Date: 23/04/2012

Required Date: 07/05/2012

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

186.0000

1

1

**\*MS27039-1-10\***

**\*\***

Screw

Location

Loc Qty

Loc Code

GA

100

120449

100

ST291

86

120120

86

AN4-41A

Purchased

No

220

Each

583.0000

8

8

**\*AN4-41A\***

**\*\***

Bolt

Location

Loc Qty

Loc Code

360

181

121185

181

ST360

402

115108

3

115705

7

117619

27

118451

50

118838

50

119328

100

120423

150

121205

15

AN4-6A

Purchased

No

220

Each

1,497.000

16

16

**\*AN4-6A\***

**\*\***

Bolt

Location

Loc Qty

Loc Code

ST356

1497

119017

997

121243

500

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Shop Packet Print

Page 3

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Parent Item: D350-748-101

**\*D350-748-101\***

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 23/04/2012

Required Date: 07/05/2012

Start Qty: 1.00

Required Qty: 1.00

AN5-32A Purchased No

220

Each

204.0000

4

4

**\*AN5-32A\***

**\*\***

Bolt

Location

Loc Qty

Loc Code

ST339

204

119328

39

119862

50

120423

75

120910

30

121415

10

AN960JD416 NAS1149D0463J Purchased No

220

Each

10.0000

32

32

**\*AN960.ID416\***

**\*\***

Washer

Location

Loc Qty

Loc Code

ST351

10

116289

10

AN960JD516 NAS1149D0563J Purchased No

220

Each

0.0000

8

8

**\*AN960.ID516\***

**\*\***

Washer

D3500-1 Manufactured No

220

Each

99.0000

4

4

**\*D3500-1\***

**\*\***

Saddle

Location

Loc Qty

Loc Code

ST423

14

78595

14

ST424

55

73405

20

73406

8

76000

27

ST425

30

76940

30

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Shop Packet Print

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Parent Item: D350-748-101

**\*D350-748-101\***

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 23/04/2012

Required Date: 07/05/2012

Start Qty: 1.00

Required Qty: 1.00

D3501-1      Manufactured      No      220      Each      360.0000      16      16

**\*D3501-1\***

**\*\***

Bushing

Location

Loc Qty

Loc Code

ST051

360

67757

4

70682

82

73391

6

74866

207

77033

61

MS21042L4      Purchased      No      220      Each      6,008.000      24      24

**\*MS21042L4\***

**\*\***

Nut

Location

Loc Qty

Loc Code

ST300

6008

116188

5

119017

4

119075

999

121011

2000

121444

3000

MS21042L5      Purchased      No      220      Each      1,351.000      4      4

**\*MS21042L5\***

**\*\***

Nut

Location

Loc Qty

Loc Code

ST300

1351

116105

5

116548

43

117611

30

119109

1273

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

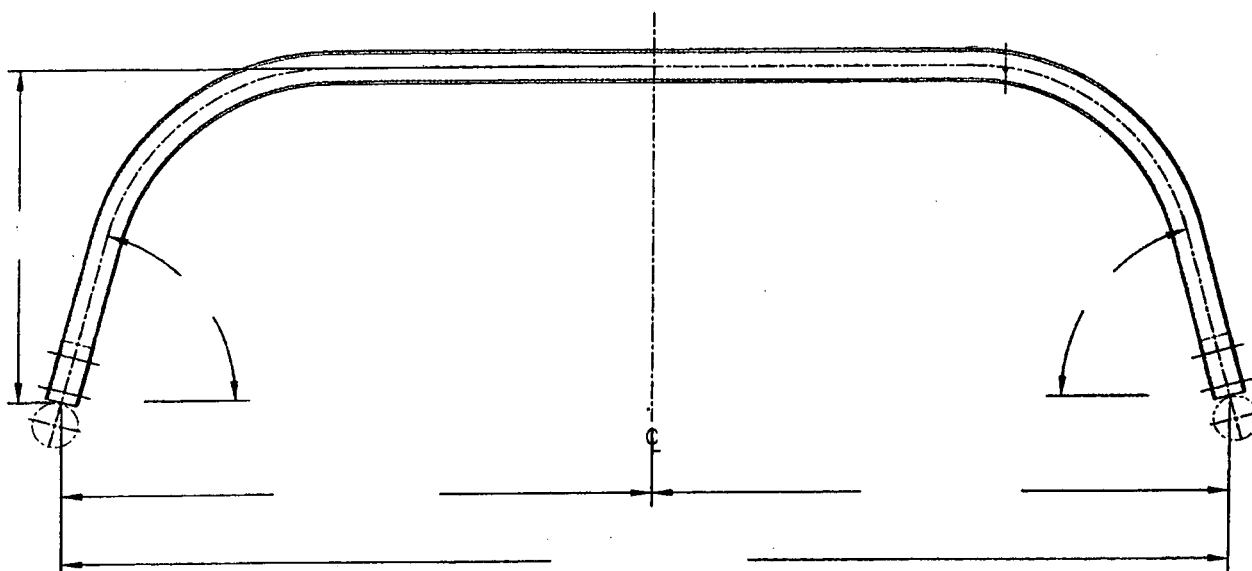
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>	<b>Work Order:</b> 83696	
<b>Description:</b> Crosstube High Fwd (AS350/355)	<b>Part Number:</b> D350-748-101	
<b>Inspection Dwg:</b> D350-748-141	<b>Rev:</b> F	<b>Page 1 of 1</b>

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_  
 Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

# GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115  
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF  
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.  
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO  
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO  
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,  
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE  
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,  
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.  
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE  
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO  
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT  
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN  
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 83696 MLC  
12/04/24

UNDER REVIEW

RELEASED  
2011-01-18

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES: UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	10.11.23		

**DART AEROSPACE LTD**  
HAWKESBURY, ONTARIO, CANADA

DRAWING NO. REV. F  
D350-748-141 SHEET 1 OF 4

TITLE SCALE  
CROSSTUBE (AS 350/355 HI FWD) NTS

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

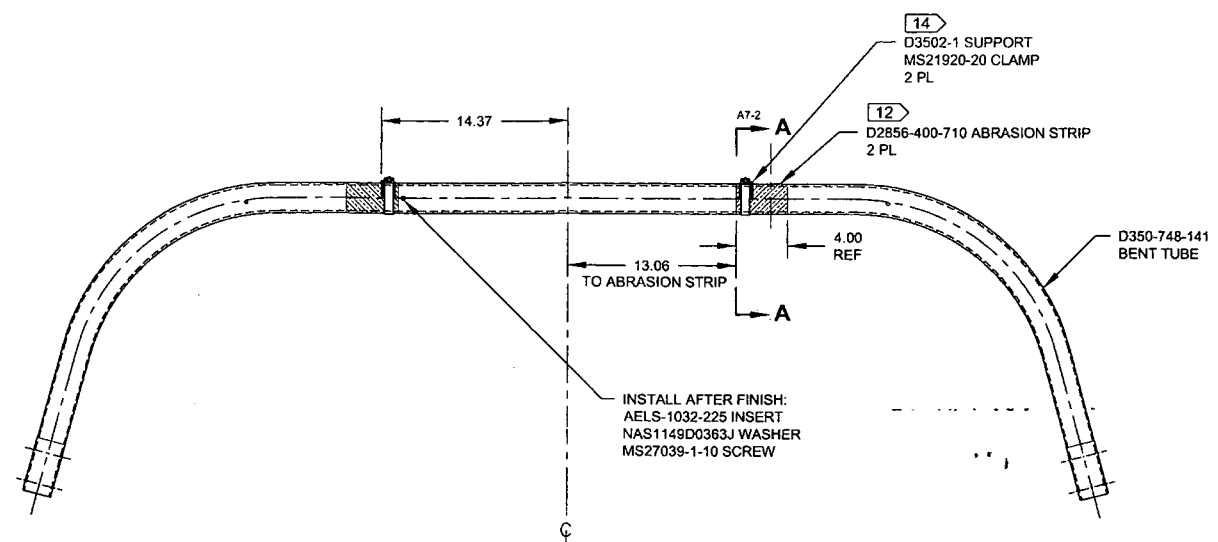
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Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

83696

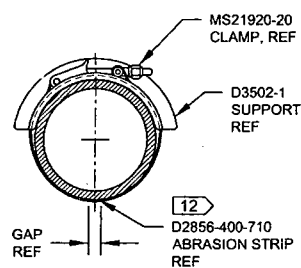


**D350-748-141  
ASSEMBLY DETAIL**

UNDER REVIEW

11.07.11

RELEASED  
2011-01-19



**SECTION A-A** D4-2  
SCALE 4X

DESIGN		<b>DART AEROSPACE LTD</b>	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

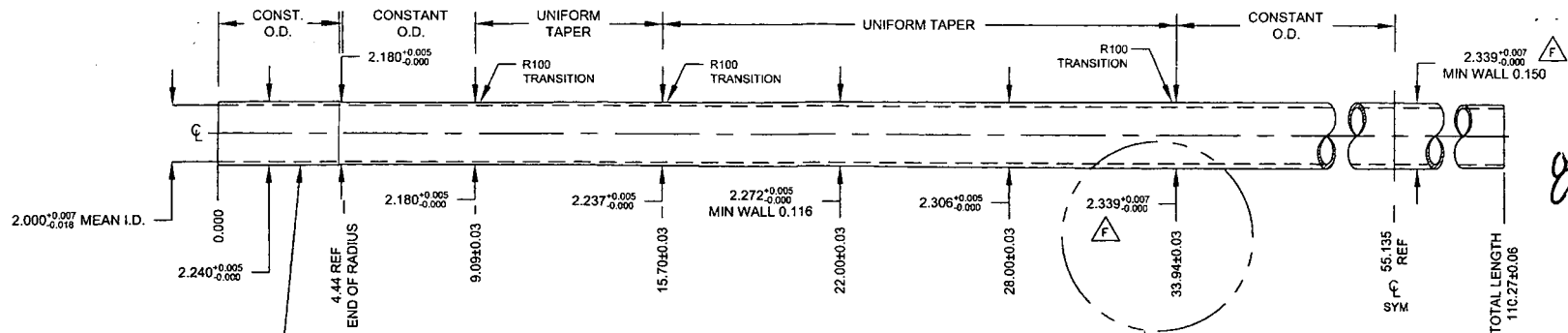
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

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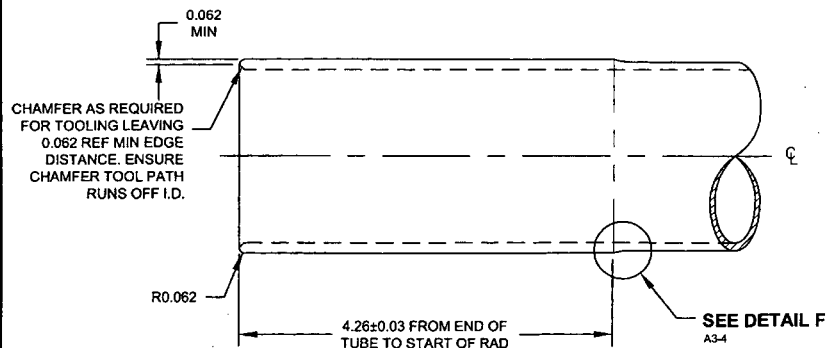
SEE DETAIL D  
A6-4

SEE DETAIL E  
A14

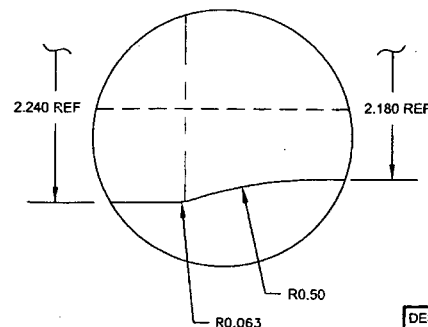
UNDER REVIEW

11.07.12

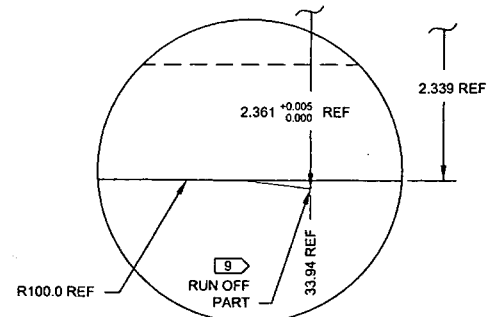
**D350-748-141TRN**  
**TURNING DETAIL**



**DETAIL D:**  
**CROSSTUBE CUFF** C7-4  
SCALE 3X



**DETAIL F:**  
**CUFF TRANSITION** A5-4  
NOT TO SCALE



**DETAIL E:**  
**TAPER RUN-OFF** C3-4  
NOT TO SCALE

**RELEASED**  
2011-01-18

DESIGN	9P	<b>DART AEROSPACE LTD</b>	
DRAWN	9P	HAWKESBURY, ONTARIO, CANADA	
CHECKED	13	DRAWING NO.	REV. F
MFG. APPR.	13	D350-748-141	SHEET 4 OF 4
APPROVED	13	TITLE	SCALE
DE APPR.	13	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.10.05	161	LOAD TUBE TO 3500 <sup>lb</sup> FOR 1 MINUTE. REF D.S. EMBIL.					
11.10.05	162	NDT TUBE.					

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

## Chris Provencal

---

**From:** David Shepherd <dshepherd@dartaero.com>  
**Sent:** Tuesday, April 27, 2010 3:40 PM  
**To:** 'Mike Petsche'  
**Cc:** 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com  
**Subject:** 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

DRAWING NO. D350-748-141	TITLE CROSSTUBE (AS 350/355 HI FWD)	REV. F	<b>DART AEROSPACE LTD ENGINEERING ORDER</b>		D.E.O. NO. D350-748-141 F-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>UP</i>	CHECKED <i>[Signature]</i>	MFG. APPR. <i>[Signature]</i>	APPROVED <i>[Signature]</i>		DE APPR. <i>[Signature]</i>		
DATE 12.04.02	DATE 12.04.03	DATE 12.04.03	DATE 12.04.03		DATE 12.04.03		

**PURPOSE:**

ADD A STRESS RELIEF OPERATION FOLLOWING BENDING

**CHANGE:**

ADD

10) AFTER BENDING: STRESS RELIEF AT 650°F ± 25°F FOR A MINIMUM OF 2 HRS.  
AIR COOL TO AMBIENT TEMPERATURE  
(REF. AMS2759/1E)



Metcor Inc.  
560, boul. Arthur-Sauvé  
St-Eustache (Québec) J7R 5A8  
Tél.: 450-473-1884

**Certificat de Conformité**  
**Certificate of Compliance**

BON DE TRAVAIL order	CHARGEMENT load
175926	1

CLIENT / customer 215  
DART AEROSPACE  
1270 ABERDEEN  
HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:  
DART AEROSPACE  
1270 ABERDEEN  
HAWKESBURY

ON K6A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
16954		Steel		

**SPÉCIFICATIONS DU PROCÉDÉ**  
processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results  
Visual

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
7	210	D350-748-101 (1) CROSS TUBE  (1) D350-748-101 CROSS TUBE  (1) D350-748-101 CROSS TUBE  (1) D350-748-101 CROSS TUBE  (1) D350-748-101 CROSS TUBE  (1) D350-748-101 CROSS TUBE  CONTENANT: 1 PALETTE

COMMENTAIRES / comments

Metcor Inc.  
560, boul. Arthur-Sauvé  
St-Eustache (Québec) J7R 5A8

**Certificat de Conformité**  
**Certificate of Compliance**

BON DE TRAVAIL order	CHARGEMENT load
175926	1

 **Metcor Inc.**

CLIENT / customer 215

DART AEROSPACE  
1270 ABERDEEN  
HAWKESBURY

ON K8A 1K7

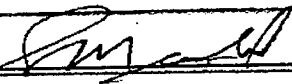

LIVRÉ À / shipped to:

DART AEROSPACE  
1270 ABERDEEN  
HAWKESBURY

ON K8A 1K7

COMMENTAIRES / COMMENTS

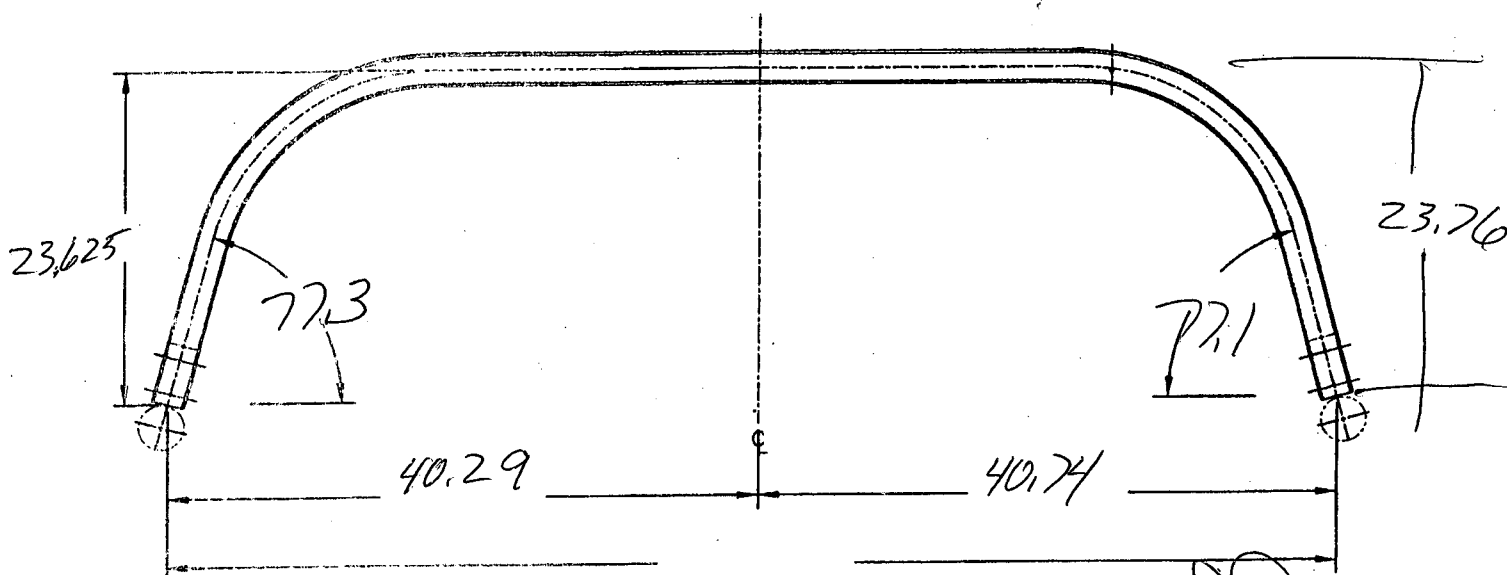
INSPECTEUR / inspector:

DATE: 2012-05-14

DART AEROSPACE LTD		Work Order: 83696
Description: Crosstube High Fwd (AS350/355)		Part Number: D350-748-101
Inspection Dwg: D350-748-141 Rev: F		Page 1 of 1

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
TWIST 0.122
SCRAP P.N. 0.15

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	

1958  
1959

2.210  
2.209